

Course guide

340077 - ELRM-D4O37 - Elasticity and Strength of Materials

Last modified: 17/05/2023

Unit in charge: Vilanova i la Geltrú School of Engineering

Teaching unit: 737 - RMEE - Department of Strength of Materials and Structural Engineering.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2023

ECTS Credits: 6.0

Languages: Catalan

LECTURER

Coordinating lecturer: ELSA PÉREZ GUINDAL

Others: Junquera Fernández, Jose Luis
Perez Guindal, Elsa

PRIOR SKILLS

Knowledge of mechanical physics, especially static equilibrium of mechanical sets.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

2. G1. Ability to solve arithmetic problems related to engineering. Aptitude to apply knowledge concerning: linear algebra, geometry, differential geometry, differential and integral calculus, numerical methods, statistics technology.
3. D1. Knowledge of fundamental principals of mechanics of solids rigids and its application of resolving problems concerning engineering (CINEMATICA, statics, dynamics)
4. D5. Ability to carry out and analyze experiments of mechanism and resistant elements.
5. D4. Knowledge of material elasticity and resistance and its application to resolve engineering problems.
6. D8. Ability to dimension and to select machines and structure elements.

Transversal:

1. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.
- 07 AAT N3. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

TEACHING METHODOLOGY

The hours of guided learning will be distributed in theoretical classes with the large group in which the concepts of the subject and direct applications will be taught, as well as the problems of the subject; and in the small group, 5 laboratory practices were carried out individually, constituting a test in which the theoretical knowledge acquired is evaluated, as well as, the results obtained in the experimentation carried out.

After each session, tasks are proposed to be worked out of the classroom individually or in the group to reinforce knowledge. All the necessary material for the subject is provided through Athena, where you will find theoretical materials, practical problems, ordered by course topics, and recommended bibliography, and thus promote self-learning through readings and problem solving.

LEARNING OBJECTIVES OF THE SUBJECT

Set the general equations that govern the phenomena that occur inside an elastic body when it is subjected to external actions, to determine the strain and strength state of a body (elasticity). Learn to find the critical differential points of real pieces where the stress and strain are maximum and apply the equations of the strength of materials to calculate such stresses, and use the elasticity equations to find the 2D or 3D state of tensions of those differential points in the space. All this is applied to the learning of dimensioning and design of mechanical elements from the point of view of the strength of the materials (resistant capacity, deformation, rigidity, etc. depending on the materials applied).

STUDY LOAD

Type	Hours	Percentage
Self study	90,0	60.00
Hours large group	45,0	30.00
Hours small group	15,0	10.00

Total learning time: 150 h

CONTENTS

(ENG) - ELASTICITAT: Vector Tensió i estat tensional pla.

Full-or-part-time: 19h

Theory classes: 3h

Practical classes: 2h

Laboratory classes: 2h

Self study : 12h

(ENG) - ELASTICITAT: Estat de deformacions en el sòlid elàstic

Full-or-part-time: 5h 20m

Theory classes: 1h

Practical classes: 1h

Self study : 3h 20m

(ENG) - ELASTICITAT: Relacions entre tensions i deformacions

Full-or-part-time: 12h 40m

Theory classes: 1h

Practical classes: 2h

Laboratory classes: 2h

Guided activities: 1h

Self study : 6h 40m

(ENG) - RESISTÈNCIA DE MATERIALS: Tracció i compressió

Full-or-part-time: 20h

Theory classes: 4h

Practical classes: 2h

Laboratory classes: 2h

Self study : 12h



(ENG) - RESISTÈNCIA DE MATERIALS: Torsió

Full-or-part-time: 18h

Theory classes: 2h

Practical classes: 4h

Self study : 12h

(ENG) - RESISTÈNCIA DE MATERIALS: Forces tallants

Full-or-part-time: 10h 40m

Theory classes: 1h

Practical classes: 3h

Self study : 6h 40m

(ENG) - RESISTÈNCIA DE MATERIALS: Flexió

Full-or-part-time: 22h

Theory classes: 4h

Practical classes: 4h

Laboratory classes: 2h

Self study : 12h

(ENG) - RESISTÈNCIA DE MATERIALS: Sol·licitacions combinades

Full-or-part-time: 24h

Theory classes: 4h

Practical classes: 4h

Self study : 16h

GRADING SYSTEM

EXAMINATION RULES.

Electronic devices, such as mobile phones, cannot be carried. During the tests, the documentation previously established by the teacher in class and prepared by the student himself individually and in handwriting will be able to be consulted.

BIBLIOGRAPHY

Basic:

- Goodno, Barry J.; Gere, James M. Mecánica de materiales. 9a ed. Cuajimalpa, Ciudad de México: Cengage Learning, 2019. ISBN 9786075268194.

- Beer, Ferdinand Pierre; Johnston, E. Russell; DeWolf, John; Mazurek, David F. Mecánica de materiales [on line]. 7a ed. México: McGraw-Hill Education, 2017 [Consultation: 19/02/2024]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=8071. ISBN 9781456260866.



RESOURCES

Other resources:

Teaching material (theory and exercises) will be hang on the Atenea during de course.